

Abstract: Ares Launch Vehicles Overview

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Since 2005, the Ares Projects have been building the nation's next generation of crew and cargo launch vehicles. As part of the Constellation Program, the Ares vehicles will enable astronauts in the Orion crew exploration vehicle and Altair lunar lander to reach the Moon and beyond. These vehicles draw upon hardware and experience developed over 50 years of exploration, while also incorporating technology and management practices from today. Ares is concentrating on building the Ares I crew launch vehicle to ensure America's continued ability to send crews to the International Space Station. Progress has been made on design, fabrication, and testing for the first stage, upper stage, upper stage engine, and integrated vehicle. This presentation will provide an overview of the Ares launch vehicles' architecture, milestone progress, and top project risks.



Ares Launch Vehicles Overview

September 16, 2009





Agenda

- ◆ **Ares Overview – Teresa Vanhooser**
- ◆ **First Stage – Alex Priskos**
- ◆ **Upper Stage – Craig McArthur**
- ◆ **Upper Stage Engine – Mike Kynard**
- ◆ **Ares I-X Flight Test – Steve Davis**
- ◆ **Ares V Cargo Launch Vehicle – Steve Creech**
- ◆ **Q & A**



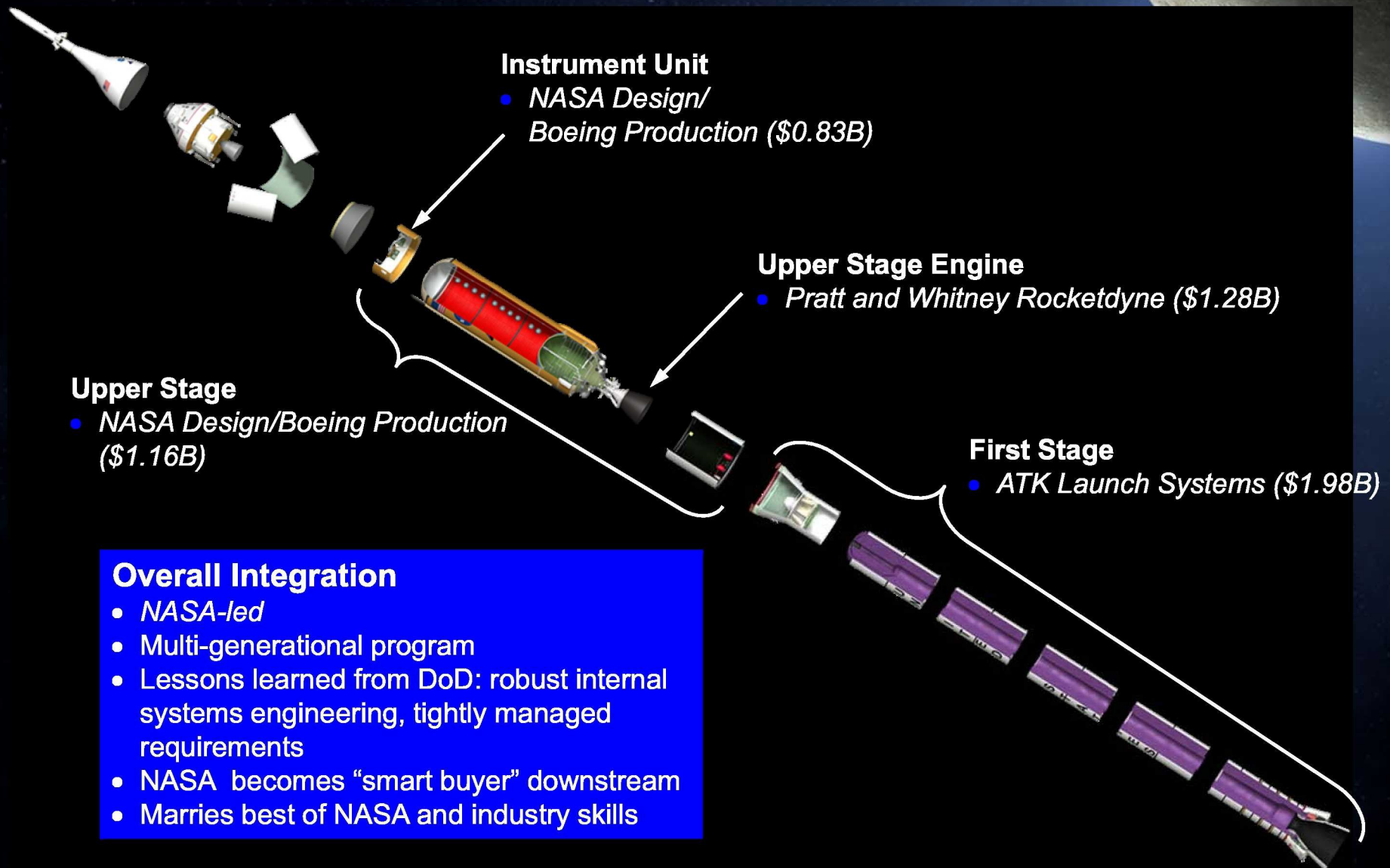
Ares Family of Launch Vehicles



- ◆ Shuttle-derived launch vehicle family for LEO and beyond missions
- ◆ Common boosters, upper stage engines, manufacturing, subsystem technologies, and ground facilities
- ◆ Investment in Ares I for Initial Capability reduces funding required and risk on Ares V for lunar capability
- ◆ First development flight test, Ares I-X, scheduled for later this year



Ares I Elements

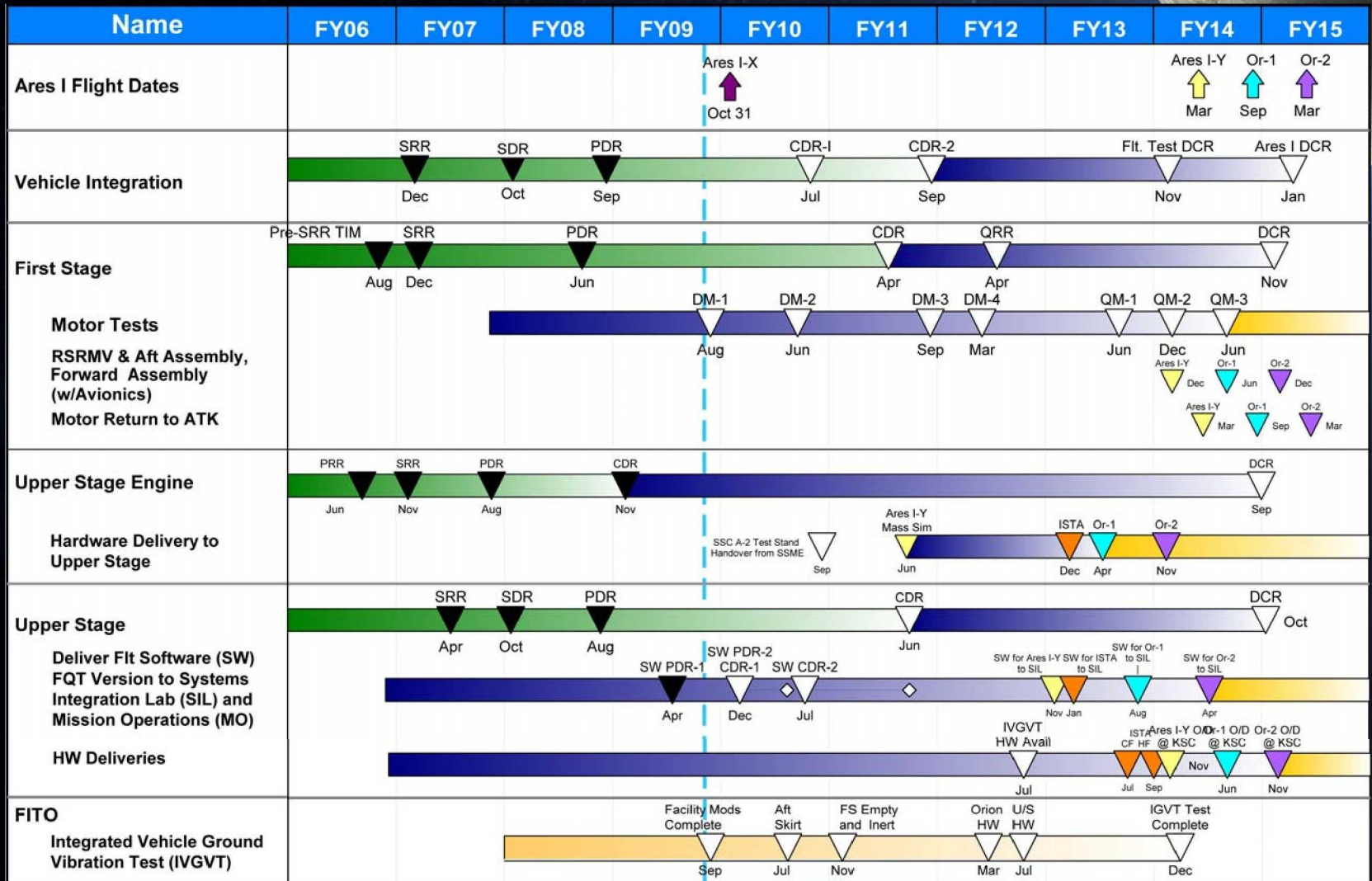


Overall Integration

- NASA-led
- Multi-generational program
- Lessons learned from DoD: robust internal systems engineering, tightly managed requirements
- NASA becomes "smart buyer" downstream
- Marries best of NASA and industry skills



Ares I Schedule



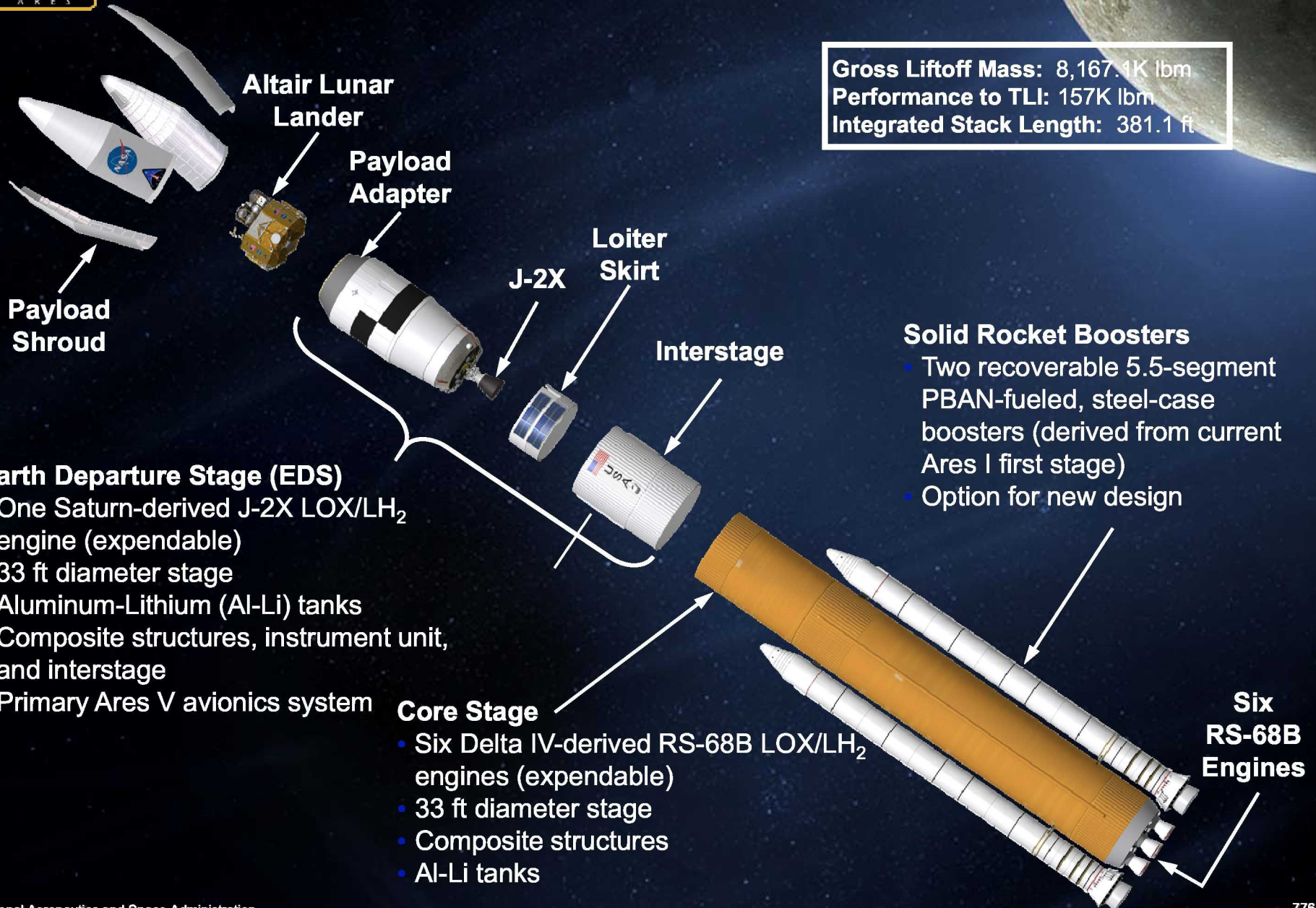
To date, the Ares I project has completed a total of 204 design reviews, ranging from components up through subsystems, elements, and the integrated Ares launch vehicle.



Ares V Elements

Current Point-of-Departure

Gross Liftoff Mass: 8,167.1K lbm
Performance to TLI: 157K lbm
Integrated Stack Length: 381.1 ft





Progress on Key Risks

- ◆ **The current top Ares I systems risks analyzed and being actively mitigated are :**
 - First Stage Thrust Oscillation – Plan in place, baseline selected and being implemented
 - Mobile Launch Platform Lift-off Clearance -- Re-Contact resolved mitigating plume tower interaction
 - Separation System Pyro-shock – Mitigation in place with selection of separation system
 - Upper Stage Vibroacoustics – Using total vehicle approach to refine environments and develop component solutions
 - Ares I Payload Mass Performance – Meeting requirements and holding adequate mass margins. Mass is continually monitored as a top performance metric.
- ◆ **The program expects to retire these while identifying new challenges as the program proceeds to CDR**

Summary

- ◆ Ares is built on a foundation of proven technologies, capabilities, and infrastructure
- ◆ The Ares I team has met all key milestones since Project inception, including four major prime contract awards and a successful Preliminary Design Review
- ◆ Ares V project is well underway
- ◆ Ares V will be considered a national asset with unprecedented performance and payload volume that can enable or enhance a range of future missions
- ◆ External assessments continue to validate the architectures
- ◆ The Ares team has proven that it is ready to execute whatever mission is set before it